

October 22, 2020

Marlene H. Dortch
Secretary
Federal Communications Commission
Office of the Secretary
45 L Street NE
Washington, D.C. 20554

Dear Ms. Dortch:

In the six months since the Commission unanimously approved Ligado Networks LLC's ("Ligado") license modification applications, we have been hard at work on the compliance measures set forth in the Commission's April 22, 2020 Order ("Order").¹ Pursuant to the Order's requirements,² we hereby submit the attached status report concerning our operations.

As this status report demonstrates, we have begun implementing the various operational safeguards required by the Order. Among these efforts, we have begun building a base station database, established a toll-free number and reporting system for interference complaints, and incorporated "stop buzzer" functionality into our planned network operations procedures.

We have also made every effort to engage with federal agencies to exchange information related to their GPS devices and address any concerns they may have about the potential for interference. Despite our outreach (described fully on page 5 of the attached)—and the Order being in full force and effect—no federal agency has provided any information to indicate that any of its GPS devices may need repair or replacement. Nevertheless, we stand ready to work with these agencies if in fact they have any legitimate interference concerns.

We remain in full compliance with the conditions of our license and we look forward to further progress in providing next-generation services and supporting the nation's efforts to win the race to 5G.

Sincerely,

/s/ Valerie Green
Valerie Green
Executive Vice President
Chief Legal Officer
Ligado Networks

¹ *Ligado Amendment to License Modification Applications IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091*, Order and Authorization, 35 FCC Rcd 3772, IB Docket Nos. 11-109, 12-340 (2020).

² *See id.* at 3841 ¶ 154.

STATUS REPORT OF LIGADO NETWORKS, LLC

Since the Commission’s unanimous approval of our license modification applications in April,¹ Ligado Networks, LLC (“Ligado”) has been working to put our 30 megahertz of greenfield spectrum to use supporting next-generation 5G services and accelerating the deployment of broad-based 5G coverage. Pursuant to the conditions of the Commission’s April 22, 2020 Order (“Order”),² Ligado submits this initial status report to update the Commission on the steps we have taken to implement the license conditions imposed on Ligado in the Order.

I. Implementation of Operational Safeguards

In preparation for the deployment of our spectrum, the company has taken steps to put in place operational safeguards establishing the notification and remediation protocols set forth in the Order. Thus, in compliance with the conditions in the Order,³ the company already has begun building a base station database, established a toll-free number and reporting system for interference complaints, and incorporated “stop buzzer” capability into its planned network operations procedures.

A. Base Station Database

Although network deployment plans are not yet finalized, Ligado has begun building a base station information database for the aviation community. Consistent with the Order and our

¹ *Ligado Amendment to License Modification Applications IBFS File Nos. SES-MOD-20151231-00981, SAT-MOD-20151231-00090, and SAT-MOD-20151231-00091*, Order and Authorization, 35 FCC Rcd 3772 (2020) (“Order”).

² *See id.* at 3841 ¶ 154 (“Commencing six months after the release of this Order and Authorization, Ligado shall file status reports with the Commission every six months in IB Docket Nos. 11-109 and 12-340 . . .”).

³ *See id.* at 3838–39 ¶¶ 146–47.

commitments in the record,⁴ Ligado stands ready to work with aviation stakeholders to establish and maintain a database of its base stations in whatever format is best suited to ensuring aviation safety. Given Aviation Spectrum Resources Inc.'s ("ASRI") prior representations and stated interest in this database, we still believe that the aviation industry would be best served by ASRI's management of this reporting mechanism. However, despite Ligado's commitment to fund the building and maintenance of the database, ASRI remains uninterested in collaborating or participating in any way whatsoever in the dissemination of information to the aviation industry. Therefore, the company has taken concrete steps to comply with this important condition.

Consistent with the standards articulated by the Commission,⁵ the database will include (as it becomes available): the longitude and latitude of each Ligado base station; the antenna radiation center height above ground level for each base station; antenna tilt, including both mechanical and electrical tilt; and the technical specifications of all base station antennas, including polarization and pattern.⁶

To assist with the construction and hosting of the database, Ligado has selected TeleWorld Solutions, Inc., a leading network services and software development provider, as the vendor to handle this project. Populating the database will not be possible until we finalize location and technical details for our base stations, but Ligado has already begun committing resources and establishing network tools to facilitate the export of this information. We are also

⁴ See *id.* at 3839 ¶ 147; Reply Comments of Ligado Networks LLC, IB Docket No. 11-109 (July 19, 2018).

⁵ See Order at 3839 ¶ 147.

⁶ The attached conceptual rendering shows how this data will appear in the database. See Ligado Base Station Database (attached as Exhibit A).

exploring the most efficient means of making this database readily available to the aviation community, including the creation of a freestanding web portal for interested parties to access at their discretion. This web portal, combined with TeleWorld's hosting and support services, will provide Ligado with the ability to distribute updates to the aviation industry regarding any new base station deployments. These resources will also allow Ligado to provide advance notice of base station location and technical information consistent with the Order's requirements.⁷

It is our sincere hope that ASRI will consider participating in the process they have long argued is essential to protecting the aviation community. Ensuring aviation safety—along with ensuring our spectrum neighbors remain free from harmful interference—remains our priority as we look to put our spectrum to use. Ligado is accordingly prepared, with or without the involvement of ASRI or others, to move forward with building and maintaining a base station database, and work on this asset is already well underway.

B. Reporting Hotline and Notification Process for Interference Complaints

To comply with the license condition that Ligado maintain a reporting and notification process for apparent incidences of interference from our operations to GPS,⁸ we have established a toll-free reporting hotline and developed internal processes to timely respond to any complaints.

For the reporting of any complaints, Ligado has already established a toll-free telephone number that will connect callers to a dedicated response hotline. When finalized, this hotline will be reachable at (833) 888-0237 and will be prominently featured on Ligado's website and prioritized for web search optimization in advance of our initial base station deployments. The

⁷ See Order at 3839 ¶ 147.

⁸ See *id.* at 3838–39 ¶ 146.

hotline will prompt callers for their name, contact information, and the time and location details of the presumed disruption. Upon receiving a complaint, qualified technicians will investigate any reports of possible interference, including contacting callers for more information when necessary, and develop remedial measures.

Our technicians will also notify the Commission's Operations Center via email and phone within one hour of receiving a report of GPS disruption.⁹ This notification will include details of the disruption, contact name of the reporting party, location of the disruption, start date and time of the event, and anticipated measures to be taken to resolve the disruption.¹⁰ These technicians will be available 24/7 to respond to any requests from the Commission's Operation Center to validate Ligado's operations in and around the area of any reported GPS disturbance. Through this notification and response process, Ligado will have the capability to address and resolve any interference complaint within 24 hours of receiving the initial report.

C. "Stop Buzzer" Capability

To ensure that Ligado can cease transmissions from all base stations within the radio horizon of an area subject to interference, we have been in discussions with base station equipment suppliers, including Nokia, and OSS solution providers about building "stop buzzer" functionality into our network operations. This "kill switch" capability will enable Ligado to immediately eliminate itself as the potential source of interference in the remote possibility that there is ever a large-scale disruption to GPS. Our reporting hotline and the 24/7 staffing of response technicians will also allow us to trigger the "stop buzzer" within 15 minutes of receiving a request from the Commission's Operations Center, should the need ever arise.

⁹ *See id.* at 3839 ¶ 146.

¹⁰ *See id.*

Ligado also has operational experience with building and maintaining an interference response system featuring these exact capabilities. We developed and established a similar response mechanism for our DVB-H network deployed in the 1670-1675 MHz band,¹¹ which even today includes kill switch functionality allowing us to shut down portions—or all—of the network, if necessary. Our engineering and operations teams have already begun leveraging this experience to establish similar functionality for our future network deployments.

II. Coordination with Federal Agency GPS Users

After the Commission’s approval of our license modification applications, we began working to establish a program to facilitate the exchange of information between our company and the U.S. Government.¹² In furtherance of this goal, we sent a letter to each member of the Interdepartment Radio Advisory Committee (“IRAC”) advising them of the launch of our information-exchange program and seeking to discuss each agency’s use of GPS.¹³ In these

¹¹ See generally *OP LLC (Crown Castle International Corp.), Licensee of WPYQ831, Petition for Waiver of Section 27.50(f)(1) of the Commission’s Rules*, 22 FCC Rcd 4322 (2007).

¹² See Order at 3838, 3840 ¶¶ 144, 151.

¹³ See Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Frederick D. Moorefield, Jr., Deputy Chief Information Officer for Command, Control, and Communications, U.S. Department of Defense (July 1, 2020) (Attached as Exhibit B); Letter from Maqbool Aliani, Chief Technology Officer, to Karen Van Dyke, Director, Office of Positioning, Navigation, and Timing & Spectrum Management, U.S. Department of Transportation (July 1, 2020) (Attached as Exhibit C); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Brian Beard, Deputy Director, Division of Biomedical Physics, Food & Drug Administration (June 30, 2020) (attached as Exhibit D); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to John Cornicelli, U.S. Department of Homeland Security (June 30, 2020) (attached as Exhibit E); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Duane Williams, U.S. Agency for Global Media (June 30, 2020) (attached as Exhibit F); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to George Dudley, U.S. Department of Energy (June 30, 2020) (attached as Exhibit G); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Ramon Gladden, U.S. Department of the Interior (June 30, 2020) (attached as Exhibit H); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Brett Greenwalt, U.S. Department of State (June 30, 2020) (attached as Exhibit I); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Christina McCann, U.S. Department of the Treasury (June 30, 2020) (attached as Exhibit J); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to

letters, we also sought input on how Ligado might assist each agency in evaluating whether and in what circumstances its GPS devices might experience harmful interference. We also reminded the agencies that, under the Commission's rules, the Order remains in full effect despite the filing of petitions for reconsideration and the NTIA's petition for stay, which do not excuse compliance with the Order or its conditions.¹⁴ Nevertheless, of the fifteen agencies contacted, only two responded, and in those replies, the agencies simply acknowledged receipt of our letter but refused to engage in any discussion concerning their GPS devices.

After reaching out to the IRAC member agencies, we sent a letter to NTIA advising them of our outreach to each of the agencies concerning their GPS devices, the general lack of responses, and the importance of NTIA engaging in this important exercise.¹⁵ To facilitate the exchange of information, we asked that NTIA assist with coordinating government participation in the programs required by the Order's conditions. In its brief response, NTIA refused to discuss these issues.¹⁶

Michael Mirando, U.S. Department of Veterans Affairs (June 30, 2020) (attached as Exhibit K); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Michael Richmond, Federal Aviation Administration (June 30, 2020) (attached as Exhibit L); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Thomas Thomison, U.S. Department of Agriculture (June 30, 2020) (Exhibit M); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Quan Vu, U.S. Department of Justice (June 30, 2020) (attached as Exhibit N); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Edward Wickenhofer, U.S. Postal Service (June 30, 2020) (attached as Exhibit O); Letter from Maqbool Aliani, Chief Technology Officer, Ligado, to Jonathan Williams, National Science Foundation (June 30, 2020) (attached as Exhibit P).

¹⁴ See 47 C.F.R. § 1.106(n) (“[T]he filing of a petition for reconsideration shall not excuse any person from complying with or obeying any decision, order, or requirement of the Commission . . .”).

¹⁵ See Letter from Doug Smith, President & CEO, Ligado, to Doug Kinkoph, Acting Administrator, National Telecommunications and Information Administration (July 17, 2020) (attached as Exhibit Q).

¹⁶ See Letter from Doug Kinkoph, Acting Administrator, National Telecommunications and Information Administration, to Doug Smith, President & CEO, Ligado (July 23, 2020) (attached as Exhibit R).

Ligado stands ready to coordinate with all government agencies interested in determining the actual effect Ligado's deployments could have on GPS. We reiterate here our request to these agencies that they provide us with information about specific GPS devices that may experience interference. And we sincerely hope that their misreading of the Commission's rules does not impede the shared national goal of putting available spectrum to work to help the United States win the race to 5G.

III. Outreach to Iridium

Ligado has also attempted to initiate discussions with Iridium Communications Inc. ("Iridium") to address any interference concerns the company may have following the Commission's approval of Ligado's license modification applications. Although the Order concluded that the Commission's ATC rules in effect since 2005 provide comprehensive interference protection to Iridium's operations,¹⁷ Ligado is mindful of the Commission's directive that the companies should cooperate to address any use cases presenting unique interference concerns.¹⁸ We also understand that, at a recent AEEC Air-Ground Communications Systems (AGCS) Subcommittee meeting, Iridium representatives indicated the company's view that Ligado's OOB will not cause harmful interference to Iridium devices during flight, taxiing, or take-off and landing. At the same meeting, we also understand that various representatives of the aviation industry encouraged Iridium and Ligado to work together to resolve any issues. In the spirit of cooperation endorsed by the Order and Iridium's own customers, Ligado sent a letter to Iridium seeking to initiate any discussions that may be needed concerning coordination. We have not yet received a response as of the filing of this status

¹⁷ See Order at 3830 ¶ 117.

¹⁸ See *id.* at 3830 ¶ 118.

report, but we stand ready to work with Iridium to come to the sort of mutually satisfactory arrangement contemplated by the Order.

* * *

Just six months since the release of the Commission's Order, Ligado has made significant progress in implementing the Order's various reporting mechanisms and operational safeguards. We also stand ready to work with all parties that may have concerns with the effects of our network on their GPS devices or operations.

We welcome any questions the Commission may have regarding our ongoing compliance efforts. Please direct any questions to the undersigned.

Sincerely,

/s/ Valerie Green

Valerie Green
Executive Vice President
Chief Legal Officer
Ligado Networks

Attachments

EXHIBIT A

Base Station ID	Sector ID	Longitude	Latitude	Height/ Radiation Center (m)	Antenna	Azimuth	Mechanical Tilt	Electrical Tilt	Expected On Air Date
LIGDPAPHLY0001	1	-75.171	39.925	23	Antenna Model 1	60	0	2	10/31/2021
LIGDPAPHLY0001	2	-75.171	39.925	23	Antenna Model 1	180	0	2	10/31/2021
LIGDPAPHLY0001	3	-75.171	39.925	23	Antenna Model 1	300	0	2	10/31/2021
LIGDPAPHLY0002	1	-75.153	39.941	20	Antenna Model 1	30	0	0	10/31/2021
LIGDPAPHLY0002	2	-75.153	39.941	20	Antenna Model 1	150	0	0	10/31/2021
LIGDPAPHLY0002	3	-75.153	39.941	20	Antenna Model 1	270	0	0	10/31/2021
LIGDPAPHLY0003	1	-75.177	39.939	29	Antenna Model 1	60	2	2	10/31/2021
LIGDPAPHLY0003	2	-75.177	39.939	29	Antenna Model 1	180	2	2	10/31/2021
LIGDPAPHLY0003	3	-75.177	39.939	29	Antenna Model 1	300	2	2	10/31/2021
LIGDPAPHLY0004	1	-75.167	39.937	27	Antenna Model 1	10	0	0	10/31/2021
LIGDPAPHLY0004	2	-75.167	39.937	27	Antenna Model 2	100	0	0	10/31/2021
LIGDPAPHLY0004	3	-75.167	39.937	27	Antenna Model 2	190	0	0	10/31/2021
LIGDPAPHLY0005	1	-75.158	39.931	18	Antenna Model 2	60	0	0	10/31/2021
LIGDPAPHLY0005	2	-75.158	39.931	18	Antenna Model 2	180	0	0	10/31/2021
LIGDPAPHLY0005	3	-75.158	39.931	18	Antenna Model 2	300	0	0	10/31/2021
LIGDPAPHLY0006	1	-75.179	39.929	13	Antenna Model 2	60	4	0	10/31/2021
LIGDPAPHLY0006	2	-75.179	39.929	13	Antenna Model 2	180	4	0	10/31/2021
LIGDPAPHLY0006	3	-75.179	39.929	13	Antenna Model 2	300	4	0	10/31/2021

NOTE: Above data is merely representative and does not reflect any actual plan or deployment. The technical specifications of base station antennas, including polarization and pattern, will be available in the database by clicking on "Antenna."

EXHIBIT B

July 1, 2020

By Email and Certified USPS Mail

Mr. Fred Moorefield
Acting DCIO for Command, Control, Communications and Computers (C4) and
Information Infrastructure Capabilities (IIC) (C4&IIC)
Office of the Department of Defense
6000 Defense Pentagon
Washington, DC 20301-6000

Dear Fred:

As you know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

We send this letter with the goal of formally launching a program to facilitate the exchange of information between Ligado and the Department, and to that end we request a phone call between our teams in the near future to discuss your agency’s use of GPS. As we begin our discussions, we think it could be helpful to know if your agency has already evaluated whether and in what circumstances its GPS devices might experience harmful interference from Ligado’s operations. We know that you and the NTIA endeavored to collect this information in the 2018 time period and we would welcome an opportunity to learn more about those efforts. In addition, we would welcome the opportunity to learn more about the specific devices that caused your agency to express concerns about the FCC’s Order. As part of our information exchange, we would also like to know whether you have any data relating to impact to GPS devices that are based on any other than metric than 1 dB.


We would also like to know if there are ways in which Ligado can assist your agency to support this evaluation process. In addition, it would be useful to understand any specific programmatic needs that Ligado should be aware of as we work with you and your colleagues to develop a program to facilitate repair and replacement of any GPS devices that are “likely to experience harmful interference from Ligado’s operations.”²

¹ See *Ligado Amendment to License Modification Applications*, Order and Authorization, 35 FCC Rcd 3772, IB Docket Nos. 11-109, 12-340 (Apr. 22, 2020).

² *Id.* at ¶ 144. The Order also requires the company to establish a program within six months. *Id.* Petitions for reconsideration and a stay of the Order were filed but such submissions “shall not excuse any person from complying with or obeying any decision, order, or requirement of (continued...) ”

Doug Smith and I look forward to working with you to re-open a dialogue and establish a program that meets your Department's needs. I can be reached via email at maqbool@ligado.com or via phone at (703) 390-2795.

Sincerely,


Maqbool Aliani
Chief Technology Officer

the Commission . . .” 47 C.F.R. §1.106(n). We also aware of efforts in Congress on this topic, but given that legislation reauthorizing the NDAA is likely to be unsettled until the end of the year, and that the outcome of any provision is in doubt until that point, we find it important to take steps now to establish this program.

EXHIBIT C

July 1, 2020

By Email and Certified USPS Mail

Ms. Karen Van Dyke
Director, Office of Positioning, Navigation, and Timing &
Spectrum Management
Office of the Secretary of Transportation
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Karen:

As you know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

We send this letter with the goal of formally launching a program to facilitate the exchange of information between Ligado and the Department, and to that end we request a phone call between our teams in the near future to discuss your agency’s use of GPS. As we begin our discussions, we think it could be helpful to know if your agency has already evaluated whether and in what circumstances its GPS devices might experience harmful interference from Ligado’s operations. We are aware of the information in the Department’s ABC Study and welcome any data that your office has on the extent to which DoT devices “experience or are likely to experience harmful interference from Ligado’s operations.”² We would welcome the opportunity to learn more about the specific devices that caused your agency to express concerns about the FCC’s Order. As part of our information exchange, we would also like to know whether you have any data relating to impact to GPS devices that are based on any other than metric than 1 dB.

In addition, we would like to know if there are ways in which Ligado can assist your agency to support this evaluation process. In addition, it would be useful to understand any specific programmatic needs that Ligado should be aware of as we work with you and your

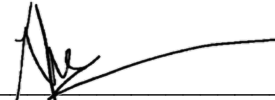
¹ See *Ligado Amendment to License Modification Applications*, Order and Authorization, 35 FCC Rcd 3772, IB Docket Nos. 11-109, 12-340 (Apr. 22, 2020).

² *Id.* at ¶144.

colleagues to develop a program to facilitate repair and replacement of any affected GPS devices.

I look forward to working with you to re-open a dialogue and establish a program that meets your Department's needs. I can be reached via email at maqbool@ligado.com or via phone at (703) 390-2795.

Sincerely,

A handwritten signature in black ink, appearing to read 'Maqbool Aliani', written over a horizontal line.

Maqbool Aliani
Chief Technology Officer

EXHIBIT D

June 30, 2020

By Certified USPS Mail

Brian Beard
Observer
Food & Drug Administration
10903 New Hampshire Ave
Room 5447, Bldg. 66
Silver Spring, MD 20993-0002

Dear IRAC Member Beard:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

We send this letter with the goal of formally launching a program to facilitate the exchange of information between Ligado and your agency, and to that end, we would like to request a phone call between our teams in the near future to discuss your agency’s use of GPS. As we begin our discussions, we think it could be helpful to know if your agency has already evaluated whether and in what circumstances its GPS devices might experience harmful interference from Ligado’s operations. We would also like to know if there are ways in which Ligado can assist your agency to support this evaluation process. In addition, it would be useful to understand any specific programmatic needs that Ligado should be aware of as we work with you and your colleagues to develop a program to facilitate repair and replacement of any GPS devices that are “likely to experience harmful interference from Ligado’s operations.”²

¹ See *Ligado Amendment to License Modification Applications*, Order and Authorization, 35 FCC Rcd 3772, IB Docket Nos. 11-109, 12-340 (Apr. 22, 2020).

² *Id.* at ¶ 144. The Order also requires the company to establish a program within six months. *Id.* Petitions for reconsideration and a stay of the Order were filed but such submissions “shall not excuse any person from complying with or obeying any decision, order, or requirement of the Commission” 47 C.F.R. §1.106(n).

For your background, Ligado previously engaged in a similar cooperative process with another federal agency in 2017 and 2018. During that collaborative process, this agency identified GPS devices it thought might be affected by Ligado's operations. After consulting with the agency and the manufacturers of those devices to determine whether there was any chance of harmful interference, we were able to have productive discussions to determine how to correct any potential issues. That process was instructive and has helped inform our approach here. We welcome the opportunity to participate in a similar cooperative process with your agency.

We look forward to working with you to open a dialogue and establish a program that meets your agency's needs. If you are not the right point of contact, I respectfully request that you advise me who Ligado should contact to facilitate the exchange of information. I can be reached via email at maqbool@ligado.com or via phone at (703) 390-2795.

Sincerely,



Maqbool Aliani
Chief Technology Officer

EXHIBIT E

June 30, 2020

By Certified USPS Mail

John Cornicelli
Representative
Department of Homeland Security
Spectrum Services
13990 Parkeast Circle
Chantilly, VA 20151

Dear IRAC Member Cornicelli:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

We send this letter with the goal of formally launching a program to facilitate the exchange of information between Ligado and your agency, and to that end, we would like to request a phone call between our teams in the near future to discuss your agency’s use of GPS. As we begin our discussions, we think it could be helpful to know if your agency has already evaluated whether and in what circumstances its GPS devices might experience harmful interference from Ligado’s operations. We would also like to know if there are ways in which Ligado can assist your agency to support this evaluation process. In addition, it would be useful to understand any specific programmatic needs that Ligado should be aware of as we work with you and your colleagues to develop a program to facilitate repair and replacement of any GPS devices that are “likely to experience harmful interference from Ligado’s operations.”²


¹ See *Ligado Amendment to License Modification Applications*, Order and Authorization, 35 FCC Rcd 3772, IB Docket Nos. 11-109, 12-340 (Apr. 22, 2020).

² *Id.* at ¶ 144. The Order also requires the company to establish a program within six months. *Id.* Petitions for reconsideration and a stay of the Order were filed but such submissions “shall not excuse any person from complying with or obeying any decision, order, or requirement of the Commission” 47 C.F.R. §1.106(n).

For your background, Ligado previously engaged in a similar cooperative process with another federal agency in 2017 and 2018. During that collaborative process, this agency identified GPS devices it thought might be affected by Ligado's operations. After consulting with the agency and the manufacturers of those devices to determine whether there was any chance of harmful interference, we were able to have productive discussions to determine how to correct any potential issues. That process was instructive and has helped inform our approach here. We welcome the opportunity to participate in a similar cooperative process with your agency.

We look forward to working with you to open a dialogue and establish a program that meets your agency's needs. If you are not the right point of contact, I respectfully request that you advise me who Ligado should contact to facilitate the exchange of information. I can be reached via email at maqbool@ligado.com or via phone at (703) 390-2795.

Sincerely,

A handwritten signature in black ink, appearing to read 'Maqbool Aliani', is written over a horizontal line.

Maqbool Aliani
Chief Technology Officer

EXHIBIT F

June 30, 2020

By Certified USPS Mail

Duane Williams
Representative
U.S. Agency for Global Media
Spectrum Management Division
(T/EBF)
H.H.S. - N. Cohen Bldg., Room 4611
330 Independence Avenue, SW
Washington, DC 20237-0001

Dear IRAC Member Williams:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

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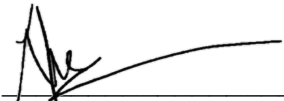
¹ See *Ligado Amendment to License Modification Applications*, Order and Authorization, 35 FCC Rcd 3772, IB Docket Nos. 11-109, 12-340 (Apr. 22, 2020).

² *Id.* at ¶ 144. The Order also requires the company to establish a program within six months. *Id.* Petitions for reconsideration and a stay of the Order were filed but such submissions “shall (continued...) ”

For your background, Ligado previously engaged in a similar cooperative process with another federal agency in 2017 and 2018. During that collaborative process, this agency identified GPS devices it thought might be affected by Ligado's operations. After consulting with the agency and the manufacturers of those devices to determine whether there was any chance of harmful interference, we were able to have productive discussions to determine how to correct any potential issues. That process was instructive and has helped inform our approach here. We welcome the opportunity to participate in a similar cooperative process with your agency.

We look forward to working with you to open a dialogue and establish a program that meets your agency's needs. If you are not the right point of contact, I respectfully request that you advise me who Ligado should contact to facilitate the exchange of information. I can be reached via email at maqbool@ligado.com or via phone at (703) 390-2795.

Sincerely,

A handwritten signature in black ink, appearing to read 'Maqbool Aliani', is written over a horizontal line.

Maqbool Aliani
Chief Technology Officer

not excuse any person from complying with or obeying any decision, order, or requirement of the Commission" 47 C.F.R. §1.106(n).

EXHIBIT G

June 30, 2020

By Certified USPS Mail

George Dudley
Representative
Department of Energy
IM-52 Forrestal Building
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear IRAC Member Dudley:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

We send this letter with the goal of formally launching a program to facilitate the exchange of information between Ligado and your agency, and to that end, we would like to request a phone call between our teams in the near future to discuss your agency’s use of GPS. As we begin our discussions, we think it could be helpful to know if your agency has already evaluated whether and in what circumstances its GPS devices might experience harmful interference from Ligado’s operations. We would also like to know if there are ways in which Ligado can assist your agency to support this evaluation process. In addition, it would be useful to understand any specific programmatic needs that Ligado should be aware of as we work with you and your colleagues to develop a program to facilitate repair and replacement of any GPS devices that are “likely to experience harmful interference from Ligado’s operations.”²

¹ See *Ligado Amendment to License Modification Applications*, Order and Authorization, 35 FCC Rcd 3772, IB Docket Nos. 11-109, 12-340 (Apr. 22, 2020).

² *Id.* at ¶ 144. The Order also requires the company to establish a program within six months. *Id.* Petitions for reconsideration and a stay of the Order were filed but such submissions “shall not excuse any person from complying with or obeying any decision, order, or requirement of the Commission” 47 C.F.R. §1.106(n).

For your background, Ligado previously engaged in a similar cooperative process with another federal agency in 2017 and 2018. During that collaborative process, this agency identified GPS devices it thought might be affected by Ligado's operations. After consulting with the agency and the manufacturers of those devices to determine whether there was any chance of harmful interference, we were able to have productive discussions to determine how to correct any potential issues. That process was instructive and has helped inform our approach here. We welcome the opportunity to participate in a similar cooperative process with your agency.

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Sincerely,

A handwritten signature in black ink, appearing to read 'Maqbool Aliani', written over a horizontal line.

Maqbool Aliani
Chief Technology Officer

EXHIBIT H

June 30, 2020

By Certified USPS Mail

Ramon Gladden
Representative
Department of the Interior
12201 Sunrise Valley Dr.
Mail Stop 241/2P1101
Reston, VA 20192

Dear IRAC Member Gladden:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

We send this letter with the goal of formally launching a program to facilitate the exchange of information between Ligado and your agency, and to that end, we would like to request a phone call between our teams in the near future to discuss your agency’s use of GPS. As we begin our discussions, we think it could be helpful to know if your agency has already evaluated whether and in what circumstances its GPS devices might experience harmful interference from Ligado’s operations. We would also like to know if there are ways in which Ligado can assist your agency to support this evaluation process. In addition, it would be useful to understand any specific programmatic needs that Ligado should be aware of as we work with you and your colleagues to develop a program to facilitate repair and replacement of any GPS devices that are “likely to experience harmful interference from Ligado’s operations.”²

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We look forward to working with you to open a dialogue and establish a program that meets your agency's needs. If you are not the right point of contact, I respectfully request that you advise me who Ligado should contact to facilitate the exchange of information. I can be reached via email at maqbool@ligado.com or via phone at (703) 390-2795.

Sincerely,



Maqbool Aliani
Chief Technology Officer

EXHIBIT I

June 30, 2020

By Certified USPS Mail

Brett Greenwalt
Representative
Department of State
IRM/EA, (SA-09)
2025 E Street, N.W.
Washington, DC 20006

Dear IRAC Member Greenwalt:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

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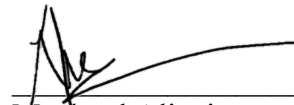
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Sincerely,



Maqbool Aliani
Chief Technology Officer

EXHIBIT J

June 30, 2020

By Certified USPS Mail

Christina McCann
Representative
U.S. Department of the Treasury
Treasury Inspector General for Tax
Administration
Technical and Firearms Support Division
12119 Indian Creek Court
Beltsville, MD 20705-4223

Dear IRAC Member McCann:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

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Sincerely,



Maqbool Aliani
Chief Technology Officer

not excuse any person from complying with or obeying any decision, order, or requirement of the Commission" 47 C.F.R. §1.106(n).

EXHIBIT K

June 30, 2020

By Certified USPS Mail

Michael Mirando
Representative
Veterans Administration
810 Vermont Avenue, NW
Washington, DC 20420

Dear IRAC Member Mirando:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

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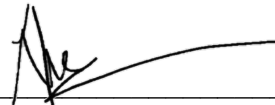
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Sincerely,

A handwritten signature in black ink, appearing to read 'Maqbool Aliani', written over a horizontal line.

Maqbool Aliani
Chief Technology Officer

EXHIBIT L

June 30, 2020

By Certified USPS Mail

Michael Richmond
Representative
Federal Aviation Admin.
Spectrum Engineering Services
800 Independence Avenue, SW
Cubical 7E-517
Washington, DC 20591

Dear IRAC Member Richmond:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

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Sincerely,



Maqbool Aliani
Chief Technology Officer

EXHIBIT M

June 30, 2020

By Certified USPS Mail

Thomas Thomison
Representative
U.S. Department of Agriculture
Forest Service/IRM
Radio Spectrum Management
201 14th Street, SW
Mail Stop 1134
Washington, DC 20250

Dear IRAC Member Thomison:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

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Sincerely,



Maqbool Aliani
Chief Technology Officer

not excuse any person from complying with or obeying any decision, order, or requirement of the Commission" 47 C.F.R. §1.106(n).

EXHIBIT N

June 30, 2020

By Certified USPS Mail

Quan Vu
Representative Alternate
Department of Justice
Spectrum Management Office
13990 Parkeast Circle
Chantilly, VA 20151

Dear IRAC Member Vu:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

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Sincerely,



Maqbool Aliani
Chief Technology Officer

EXHIBIT O

June 30, 2020

By Certified USPS Mail

Edward Wickenhofer
Representative
United States Postal Service
4200 Wake Forest Road
Raleigh, NC 27668

Dear IRAC Member Wickenhofer:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

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Sincerely,

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Maqbool Aliani
Chief Technology Officer

EXHIBIT P

June 30, 2020

By Certified USPS Mail

Jonathan Williams
Representative
National Science Foundation
2415 Eisenhower Avenue
Alexandria, VA 22314

Dear IRAC Member Williams:

I am writing to you because you serve on the Interdepartmental Radio Advisory Committee (“IRAC”) on behalf of your department or agency, and I am hoping we can find time soon to begin a dialogue regarding the company I work for, Ligado Networks.

As you may know, the Federal Communications Commission (“FCC”) recently approved Ligado’s mobile satellite services license modification applications.¹ As a condition of its Order, the FCC requires that Ligado engage and coordinate in a timely manner with any U.S. government agency and launch a program to exchange information with respect to your agency’s GPS devices. We are fully committed to our duties as an FCC licensee, and are looking forward to working with you as required to establish the type of program set out in the FCC’s Order.

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For your background, Ligado previously engaged in a similar cooperative process with another federal agency in 2017 and 2018. During that collaborative process, this agency identified GPS devices it thought might be affected by Ligado's operations. After consulting with the agency and the manufacturers of those devices to determine whether there was any chance of harmful interference, we were able to have productive discussions to determine how to correct any potential issues. That process was instructive and has helped inform our approach here. We welcome the opportunity to participate in a similar cooperative process with your agency.

We look forward to working with you to open a dialogue and establish a program that meets your agency's needs. If you are not the right point of contact, I respectfully request that you advise me who Ligado should contact to facilitate the exchange of information. I can be reached via email at maqbool@ligado.com or via phone at (703) 390-2795.

Sincerely,

A handwritten signature in black ink, appearing to read 'Maqbool Aliani', is written over a horizontal line.

Maqbool Aliani
Chief Technology Officer

EXHIBIT Q

July 17, 2020

By Email and U.S. Mail

Mr. Doug Kinkoph
Acting Administrator
National Telecommunications and Information Administration
Department of Commerce
The Herbert Hoover Building
Washington, D.C. 20230

Dear Mr. Kinkoph:

I am writing to request that we initiate discussions concerning my company's efforts to implement the program required by the Federal Communications Commission's ("FCC") April 22, 2020 approval of Ligado's mobile satellite services license modification applications.¹ We have reached out directly to many of the agencies that may have GPS devices and are now reaching out to you to ask that NTIA support this process as appropriate by helping to coordinate it.

As you know, the FCC's Order requires that Ligado engage and coordinate in a timely manner with U.S. government agencies to launch a repair and replacement program for agency GPS devices that are "likely to experience harmful interference from Ligado's operations."² While we are well aware that NTIA filed a petition for reconsideration as well as a stay, the FCC's rules make clear that the filing of a petition for reconsideration or stay "shall not excuse any person from complying with or obeying any decision, order, or requirement of the Commission" ³ Thus, Ligado is obligated by the terms of its FCC license to pursue this process and is doing so.

More importantly, and as we have conveyed to you and your colleagues over many years, Ligado is committed to protecting GPS. Ligado is also fully committed to meeting the Order's conditions and making this repair and replacement program a success. We are thus ready and willing to take the steps needed to implement the various conditions in the Order to ensure that GPS is protected. In light of the six-month requirement set forth in the Order⁴—and while we await FCC consideration of your Petitions—we would like to discuss with you the role that

¹ See *Ligado Amendment to License Modification Applications*, Order and Authorization, 35 FCC Rcd 3772, IB Docket Nos. 11-109, 12-340 (Apr. 22, 2020) ("*Ligado Order*").

² See *id.* at ¶ 144.

³ 47 C.F.R. § 1.106(n).

⁴ See *Ligado Order* at ¶ 144 ("Ligado shall launch a program to facilitate the exchange of information between it and the U.S. Government within six months of the release of this Order and Authorization").

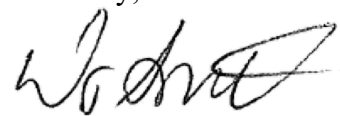
NTIA will play in coordinating government participation. We do not anticipate that this process will be burdensome for the NTIA. We ask only that you provide information about which agencies have devices you think need to be considered for repair or replacement, and inform those agencies that the reconsideration and stay petitions do not prevent them from beginning the exchange of information. Moreover, we think the exchange of information set forth in the FCC Order⁵ and coordination between Ligado and the Federal government will generate exactly the type of information that could be helpful to all parties genuinely interested in quantifying the actual impact Ligado's deployment could have on GPS.

On June 30 and July 1, we reached out to many of the potentially affected agencies. To date, we have only received an acknowledgement from one, and so we are following up with them. For your information, I have attached the letter we sent to the agencies on the IRAC, as well as the one response we received. You will see in that response that the agency is refusing to cooperate solely on the basis of the Petitions you filed. This is among the many reasons that NTIA has a unique ability to facilitate this process, and we would like to discuss next steps at your earliest convenience.

You may know that Ligado has prior experience with the sort of repair and replacement program contemplated by the FCC's Order. In late 2017 and early 2018, the company held fruitful discussions over several weeks with another federal agency. During that process, this agency identified GPS devices it thought might be affected by Ligado's operations. After consulting with the agency and the manufacturers of those devices to determine whether there was any chance of harmful interference, we were able to have productive discussions to determine how to correct any potential issues. That process was instructive and has helped inform our approach with the various agencies we have already contacted regarding the implementation of a repair and replacement program.

I look forward to working with you to open a dialogue concerning NTIA's role in the repair and replacement program required by the FCC's Order. As a first step, I propose a call with my team and the appropriate NTIA personnel at your earliest possible convenience.

Sincerely,



Doug Smith
President & CEO

Attachments

cc: Charles Cooper
Peter Tenhula
Kathy Smith
Derek Khlopin

⁵ *Id.*

EXHIBIT R



UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and
Information Administration
Washington, D.C. 20230

July 23, 2020

Mr. Doug Smith
President & CEO
Ligado Networks
10802 Parkridge Boulevard
Reston, VA 20191

Dear Mr. Smith:

I have received your letter of July 17, 2020 in which you request the initiation of discussions to implement a program in accordance with the Federal Communications Commission's (FCC's) April 22, 2020 Order and Authorization. As you know, the National Telecommunications and Information Administration (NTIA) filed, on behalf of the Executive Branch, a Petition for Stay of and a Petition for Reconsideration or Clarification of the FCC's Order and Authorization. These petitions are still pending with the FCC. Accordingly NTIA believes it would be premature to begin implementation discussions.

Sincerely,

Douglas Kinkoph

Douglas W. Kinkoph,
Associate Administrator
Performing the Delegated Duties of the
Assistant Secretary of Commerce for
Communications and Information